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LONG-BURNING LIGHT

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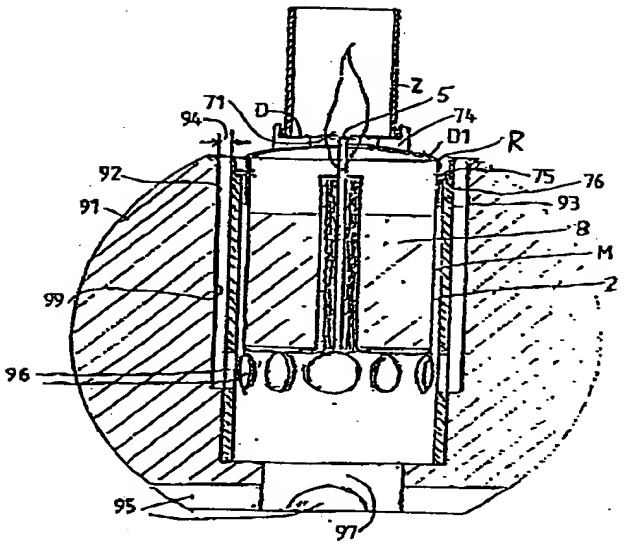
[Abstract]

Long-burning light, especially according to the main application P 4203644.5, in which a paraffin-like fuel (8) is laterally enclosed in a jacket (M), in the center of which a non-combustible wick (5) is constantly arranged so as to protrude slightly above the upper rim (R) of the jacket during burning of the fuel (8), while an air conduction cover (D, D1) with a central opening somewhat wider than the diameter of a flame is positioned on the jacket rim (R) and a cylinder (Z), especially a glass cylinder, is located thereon concentrically to the wick (5), and circumferentially spaced air inlet openings (71) are left in the air conduction cover (D) alongside the lower end of the cylinder (Z) and/or between the air conduction cover (D1) and the cylinder (Z).



The following particulars are taken from the documents submitted by the applicant.

Description

The invention pertains to a long-burning light, in particular according to the main application P 42 03 644.5, in which a paraffin-like fuel is laterally enclosed in a jacket, in the center of which a non-combustible wick is constantly arranged so as to project slightly above the upper rim of the jacket during burning of the fuel.

Long-burning lights are known, e.g., as tea lights, in which the cylinder part of the bowl-like container forming the encompassing jacket holds a molded block of paraffin with an embedded wick. On the lower end of the wick there is a plate-like wick holder so that the wick retains its perpendicular orientation even when the paraffin melts and becomes fluid as the light burns. The wick consists of cotton material saturated with paraffin, so that it is not reusable.

In the case of these known tea lights, the visible flame gradually disappears as the wick burns and becomes shorter and the level of the paraffin drops more and more and is, e.g., ultimately no longer visible or no longer adequately visible inside lanterns or wind screens or other lighting fixtures in which such tea lights are likely to be used. Furthermore, high temperatures develop in the lower part of the container as the tea light burns down, representing some risk of fire. In the case of each of the known tea lights, the bowl and the wick holder remain after burnout, so that these parts are not reusable and must therefore be recycled or even discarded.

In the case of a known candle in the form of a tea light according to DE 34 03 604 A1, the wick consisting of a cotton string is contained in an upright tube permeable to liquid fuel,

while an absorbent body surrounding the wick is provided inside this tube serves to draw up liquefied fuel, such as melted wax. The tube encompassing the wick keeps the flame from lowering with the level of the fuel being consumed. However, the tube cannot prevent the wick string of cotton material from burning away with the candle, so that the wick is consequently not reusable. This known candle cannot be reignited once it has been extinguished following partial burning and the wax remaining in the bowl-like container has solidified, for then there is insufficient wax at the upper end of the candle, where the flame burns, for the flame to burn long enough for the wax around the wick to melt and be drawn through the body surrounding the wick and fed to the flame.

On the other hand, the long-burning light according to the main application P 42 03 644.5 referred to initially provided that the flame always burns at the same height and that solid fuel can be added, so that the container and the non-combustible wick, as well as the absorbent body and the jacket, are frequently reusable. It was envisioned that one thick or several thin rings of fuel material could be stacked sequentially.

Also known are candle lights, which have a descending head with a descending jacket encompassing the block of wax and an accompanying long-burning wick, [arranged] so that the latter projects slightly above the upper jacket rim.

The objective of the invention is to achieve a quieter burning of the flame, as well as a better fuel utilization and/or a greater light and/or heat yield, with lower pollutant emission.

In realization of this objective, an air conduction cover with a central opening somewhat wider than the diameter of a flame is provided on the jacket rim, and a cylinder, especially a glass cylinder, is located thereon concentrically to the wick, and circumferentially spaced air intake openings are left in the air conduction cover alongside the lower end of the cylinder and/or between the air conduction cover and the cylinder.

Advantageous embodiments are specified in the subordinate claims.

The innovative configuration of the cover with the air intake openings and the surmounted glass cylinder results in a concentration of the flame zone, so that a higher burning temperature and a greater light and heat yield can be achieved while the dimensioning of the wick remains the same. It goes without saying that normal brightness and therefore a longer burning time can be realized with a commensurately smaller wick diameter.

A shorter and narrower cylinder with approximate dimensions of 22 mm in diameter and 35 mm in length, or the flame with minimal diameter and 35 mm in length [sic*], which projects beyond the flame by at least 5 mm, can be used or a longer and relatively wider cylinder, which has however at the upper end a cover with a central exit opening with a width comparable to that

* [Editor's note: This sentence is garbled in the original, possibly because of omitted words.]

of the narrow cylinder, i.e., 2 to 3 times the diameter of the flame [can be used]. Because of the lower inlet temperature, the sum of the diameters of the intake openings is kept somewhat smaller than the diameter of the exit. In this manner, a flow of cold air through the upper central exit opening is avoided and quiet, loss-free burning of the flame is realized. The sum of the intake diameters is adapted to the oxygen requirement of the flame, with allowance made for the flow conditions, so that neither sooting of the flame nor unnecessary cooling of the same occurs.

It is advantageous for the intake openings to be located near the flame, so that the wax will not be cooled, and, in order for the flame to well supplied, the inside diameter of the cover is less than that of the cylinder. It has been shown to be favorable for the inside diameter to be about 11 mm and only slightly greater than the diameter of the flame. Conveniently, the cover has a flat depression or protuberance around the inner opening, so that the cylinder can be securely centered therein.

It has also been shown to be advantageous to provide a sub-cover in the cover, which has a greater inside diameter of approximately 19 mm and is separated from the dome of the upper cover by 1-3 mm, so that the intake air can pass through the gap without cooling the liquid wax.

When, e.g., such a long-burning light, with a bowl containing two or three stacked rings of fuel material, is ignited, the fuel material, e.g. paraffin, is known to melt in the immediate vicinity of the flame and to flow to the wick through a perpendicular interstice in the tube encompassing the absorbent body. The paraffin rings gradually melt completely, so that the fuel material in the bowl is fully fluid. Once the fuel material is consumed, the flame goes out. Additional rings of fuel material can be added, whereupon, thanks to the fuel material surrounding the bundle of fibers constituting the wick stamped out thereby, a flame can be readily ignited at the tip of the bundle of fibers. Even when the long-burning light has been extinguished before the fuel material in the bowl-like container has been consumed, a ring of the solid fuel material of appropriate thickness can be inserted before the flame is reignited.

With the innovative design, in which the cover with the air openings, which bears the glass cylinder, sits on the bowl walls of the jacket, a greater part of the heat radiated out from the flame is diverted by the cover and passed via the jacket to the base of the bowl, so that all of the fuel melts even when the bowl is 4 times as high as those currently in use, i.e., over 70 mm high. This provides a long burning duration and thus precludes frequent replacement of fuel material tablets.

The absorbent body preferably consists of essentially perpendicularly oriented glass wool fibers with embedded thin copper wires. The great interstitial space in the glass wool provides a considerable prepositioned supply of fuel, which gives good fueling of the flame during the time between ignition and liquefaction of the fuel outside the sheath. Copper wires, e.g., 24 of them, are present, have a diameter of 0.1 mm and serve to conduct the heat into the interior of the wick.

Located above the glass wool filling of the absorbent body, as the closure of the sheath, is a cap of sheet steel 0.15 mm thick. This is preferably laminated on the top side with a wafer of woven glass fibers approximately 0.15 mm thick. This inhibits heat flow during ignition and therefore the immediate flow of the wax to the wick.

The tubular sheath is retained in a holder running parallel to and preferably lying on the base of the bowl, so that the sheath is held in the middle and therefore is centered in the bowl. A metal coated glass fiber mat is preferably used as the holder, which practically completely conveys the liquid fuel material to the wick. The metallic sheath is stamped out with right or acute angled tabs bent out in a star pattern, while either the entire sheath or the tabs are stuck through the mat and thus provide the sheath with a well-centered hold in the container. The star-shaped support tabs also provide an adequate counter-support when a new ring of fuel material is added and in the process its bead area is punched out by the rim of the sheath as free fuel material adjacent to the wick. When the sheath tabs are inserted into the glass fiber mat, small wedge areas preferably remain free between the tabs and above the mat, through which the liquid fuel material can flow to the body of the wick. Furthermore, the base side of the mat conveys the fuel to the wick body and to the bundle of fibers, which conveniently extends thereto. In order for the heat absorbed by the sheath to contribute as fully as possible to melting the fuel, provision is advantageously made for a central depression in the base of the bowl, which is usually made of sheet metal, so that the attachment tabs do not touch the base.

Located inside the bowl-like container and near its base is a heat-conducting layer, e.g., an aluminum foil, which conducts the heat laterally away from the sheath, so that the fuel in the container is completely consumed and can flow to the other end of the wick [sic; flows and can be consumed]. Advantageously located under the metallic, fire-preventive foil is a disc of glass fiber mat, which conveys the fuel material to the absorbent body. It also provides the sheath with a hold for the star-shaped, angled holding tabs formed thereon. The foil is preferably laminated onto the mat.

The longitudinal slit in the tubular wick holder is appropriately only a few hundredths of a millimeter wide, in order to preclude the flame from extending outside the sheath and the absorbent body from creeping downward when the container has been extensively emptied by burning.

Other advantageous refinements result when the light is set into decorative holders. For example, provision is made for the ordinary thick, decorative candles, which, if they are to be lit at all, are usually burned away only to a slight extent and then merely soot up and flicker, to be provided with a cylindrical recess and equipped with an internal receiver tube separated from the wall by 1-2 mm, surrounding the bowl of the light with a thermally insulating gap. At the base, the decorative body is provided with air intake slits, so that cool air can spread out beneath and

alongside the bowl through a collar of cool air holes, and the outer part of the block of wax is not melted. The interior of the recess is advantageously faced with a reflective foil, so that soft wax can also be used for the decorative body. In order to maintain the separation, the jacket of the bowl is provided with a supporting collar, preferably of plastic, that is positioned beneath the rim of the cover.

The high-capacity bowl can also be advantageously used in any desired decorative body in lamps or candle form. The empty space at the bottom is available for storing additional fuel elements.

Illustrated schematically in the appended drawings are embodiment examples of the long-burning light according to the invention; these depict:

Figure 1, a vertical cross section of the long-burning light in a first embodiment;

Figure 2, a top view of the cover of the long-burning light with the cylinder removed;

Figure 3, a vertical cross section through a second embodiment of the long-burning light;

Figure 4, a vertical cross section through a third embodiment of the long-burning light.

A long-burning light (1) depicted in Figure 1 has a bowl-like container (2), which encompasses the fuel (8) with a jacket (M) and can be partially closed with a removable cover (D). Both the bowl (2) and the cover (D) are made of sheet metal. In the center of the container (2) is an upright absorbent body (4), which consists of inorganic, non-combustible material and holds a central glass fiber bundle (5) or the like as the wick. The cover (D) has a central, circular opening, as shown in Figure 2. This opening is surrounded by air intake openings (70) in a star-like pattern.

The long-burning light (1) shown in Figure 1 is designed in the form of a tea light. Placed in its container (2) are rings (8) of fuel material, which can consist of paraffin, stearin or the like.

The absorbent body (4) is encased in a tubular sheath (12) stamped out of sheet metal, which has a vertical groove. Stamped out on the underside of the metal sheathing are preferably acute-angled tabs (14) of metal, which are inserted through a plate-like glass fiber mat (20) on the base side and laterally angled outward in a star pattern, so that the wick is provided with a secure hold. Above the mat (20), the tabs (14) leave tiny wedge openings, through which the liquefied fuel material flows directly to the absorbent body (4). The sheath (12) is closed at the top by a cap (16) of thin sheet steel, which is clad with a thin wafer (17) of woven glass fibers.

In order to preclude heating up and surface ignition of the fuel material, an annular cover plate (15) with ventilation holes is conveniently laminated onto the glass fiber mat (20). This cover plate (15) is a film of thermally conductive material or a thin sheet of metal, e.g., aluminum foil, completely or partly covering the mat. This distributes over the base the heat emanating from the flame and carried down by the heat-conductive material of the sheath (12), so that the fuel in the outermost areas of the container (2) remote from the flame is also

completely melted and is available to feed the flame. The glass fiber mat (20) lying on the base and the cover plate (15) are round, as shown in the top view, or otherwise cross-sectionally adapted to the form of the container (2) and are positively held therein.

Removably seated on the upper end of the bowl-like container (2) is an annular cover (D), which is made of a non-combustible material, such as metal.

The wick (5) consists of a glass fiber bundle, which is advantageously surrounded by a spiral of thin wire that hinders unraveling of the fiber bundle.

Provision is further made for a metal wire of a material with good heat conductivity and poor combustibility to be embedded in the glass fiber bundle. It consists, e.g., of copper and its diameter is so selected that a desired flame height results. During burning of the flame, the metal wire helps to conduct the heat to the material positioned lower in and around the wick (5). The metal wire preferably ends about 2-3 mm below the tip of the wick, whereby ignition is made easier since the slight ignition heat remains in the tip, and is effective.

The absorbent body (4) preferably consists of vertically oriented glass wool fibers interspersed with thin copper wires.

The cover (D) overlaps the jacket rim (R) with an encircling annular rim. The cover (D) has a concentric recess, by which the glass cylinder (Z) is kept centered. The central opening of the cover is slightly larger than the diameter of the flame and is approximately 9-12 mm across. The diameter of the cylinder (Z) is 2 to 3 times the diameter of the flame, and when the light is to be used in a warmer it is equipped with a minimal cylinder, which projects about 5 mm above the flame and has an inside diameter of 22 mm and a height of 35 mm.

Figure 3 shows an application example of the long-burning light as a decorative candle (91). The latter is provided with a recess (92) surrounding a separated receiver tube (93), which has an upper support rim (76) containing a support collar (75) that encircles the upper end of the jacket of the container near the cover and, with a narrowed section extending downward, effects a thermally insulating separation of the jacket from the receiver tube (93). The lower end of the block of wax (91) has radial air intake channels (95) opening into a central bore (97) that ventilates the receiver tube (93) from below. Beneath the container (2) the receiver tube (93) has cool air holes (96), through which cool air in the interstice makes its way along the wall to the recess (92) and is exhausted at the top. The separation (94) from the wall is 1-2 mm, so that a good flow-through of cool air is ensured. In case the decorative body (91) consists of a wax with a low temperature of deformation, it is advisable that the walls of the recess (92) be faced with a reflective foil (99).

In the present embodiment example, the cover (D) is held on supporting feet (74) resting on a sub-cover (D1), which has a central opening somewhat wider than that of the cover (D). The supporting feet (74) produce a gap between the cover (D) and the sub-cover (D1), so that an air

inlet opening (71) for combustion air is formed there. Instead of the arrangement of the two surmounted covers (D, D1) as shown in Figure 3, two such covers can be incorporated in the arrangement shown in Figure 1, in which the sub-cover is located beneath the dome-shaped, curved cover (D).

Figure 4 shows another advantageous arrangement of the light in a decorative body (90) with a stem base made of a non-softening material. Here the support collar (75) encircling the jacket (M) rests directly on a supporting rim (76) in the upper part of the decorative body (90). Thus the container (2) is optionally held completely freely, projecting from the possibly thermally conductive decorative body (90).

The cover (D) rests on the supporting collar (75) and bears the cylinder (Z), which for decorative reasons has a diameter approximately matching that of the bowl (2), and is about twice as high as the diameter. The cylinder (Z) has at the top a covering (72), which has a central exit opening (73) with a diameter somewhat greater than the sum of the diameters of the air inlet openings (71), whereby a flame burning free of drafts and flickering is ensured.

The various designs of the parts of the long-burning light according to Figures 1, 3 and 4 can be combined with one another as desired.

Claims

1. Long-burning light, especially according to the main application P 42 03 644.5, in which a paraffin-like fuel (8) is laterally enclosed in a jacket (M), in which a central, non-combustible wick (5) is constantly arranged so as to project slightly above the upper rim (R) of the jacket during the burning of the fuel (8), characterized in that an air conduction cover (D) with a central opening somewhat wider than the diameter of a flame is positioned on the jacket rim (R) and a cylinder (Z), especially a glass cylinder, is located thereon concentrically to the wick (5), and circumferentially spaced air inlet openings (70, 71) are left in the air conduction cover (D) alongside the lower end of the cylinder (Z) and/or between the air conduction cover (D) and the cylinder (Z).

2. Long-burning light according to Claim 1, characterized in that the cylinder (Z) projects above the flame by at least 5 mm, and has an inside diameter of 15 mm, preferable 22 mm.

3. Long burning light according to Claim 2, characterized in that the cylinder (Z) has an inside diameter corresponding approximately with the diameter of the jacket (M) and has a height greater than the diameter, and has at the upper end a constriction or a covering (72) with an exit opening (73), the diameter of which is somewhat greater than the sum of the diameters of air inlet openings (71, 72).

4. Long-burning light according to one of the preceding claims, characterized in that the cylinder (Z) is held in a flat depression of the air conduction cover (D) or on a ring of separating feet (74).

5. Long-burning light according to one of the preceding claims, characterized in that the air conduction cover (D) is designed as a flat dome.

6. Long-burning light according to one of the preceding claims, characterized in that the air conduction cover (D) is separated by 1-3 mm from a sub-cover (D1), which has a somewhat greater inside diameter.

7. Long-burning light according to one of the preceding claims, characterized in that the jacket (M) forms the walls of a bowl (2), and the air conduction cover (D) overlaps the jacket (M) with an annular rim.

8. Long-burning light according to Claim 7, characterized in that the bowl (2) is 18-70 mm high and the centrally arranged glass fiber long-burning wick (5) is surrounded by a somewhat lower absorbent body (4) of vertically oriented glass fiber threads with embedded thin copper wires, which is encased in a metallic sheath (12) that has a lateral slit and is covered by a metallic cap (16), out of which the wick (5) protrudes and that is covered with a wafer (17) of woven glass fibers.

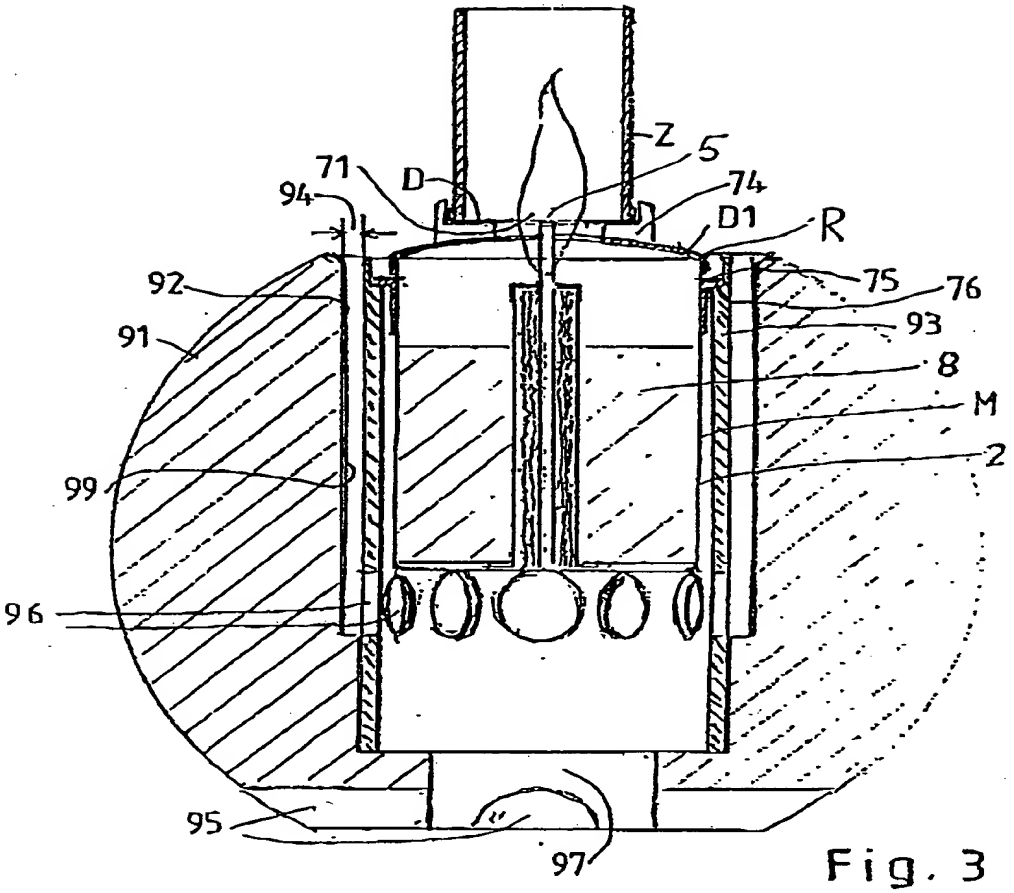
9. Long-burning light according to Claim 7 or 8, characterized in that the bowl (2) has beneath the annular rim of the cover (D) a supporting collar (75), which bears below a spacer of smaller diameter.

10. Long-burning light according to Claim 9, characterized in that the bowl (2) with the supporting collar (75) is held freely projecting in an annular support rim (76) of a decorative body (90, 91) that thermally insulates and separates it from the latter.

11. Long-burning light according to Claim 10, characterized in that the decorative body (90, 91) consist of a non-combustible material or of wax, and this block of wax (91) has a vertical, cylindrical recess (92) in which a receiver tube (93) is located in which the bowl (2) is held, and that at least in the section surrounding the bowl (2) there is an outer wall separation (94) that is ventilated from below through air intake channels (95).

12. Long-burning light according to Claim 11, characterized in that the receiver tube (93) has cool air holes (96) in the lower section and the air intake channels (95) run radially under the block of wax (91) and open into a central bore (97) in the receiver tube (93).

13. Long-burning light according to Claim 11 or 12, characterized in that the recess (92) is lined with a reflective foil (99) at least in the section with the wall separation (94).


Z
5
71
D
74
94
D1
R
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91
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99
2
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97

Fig. 3

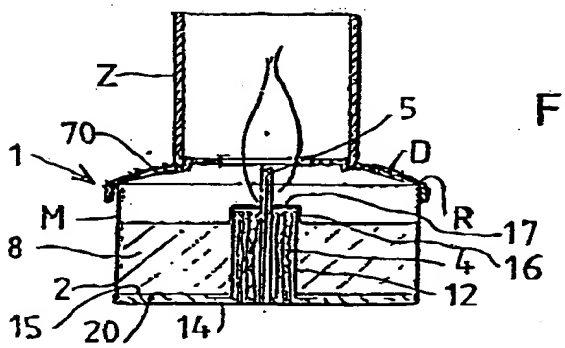
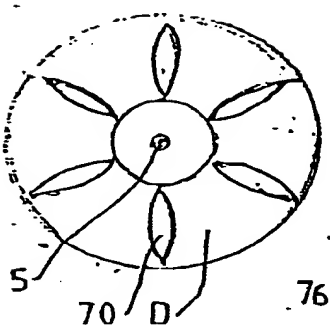

Z
5
70
1
D
M
R
17
8
4
16
2
12
15
20
14

Fig. 1

Fig. 2



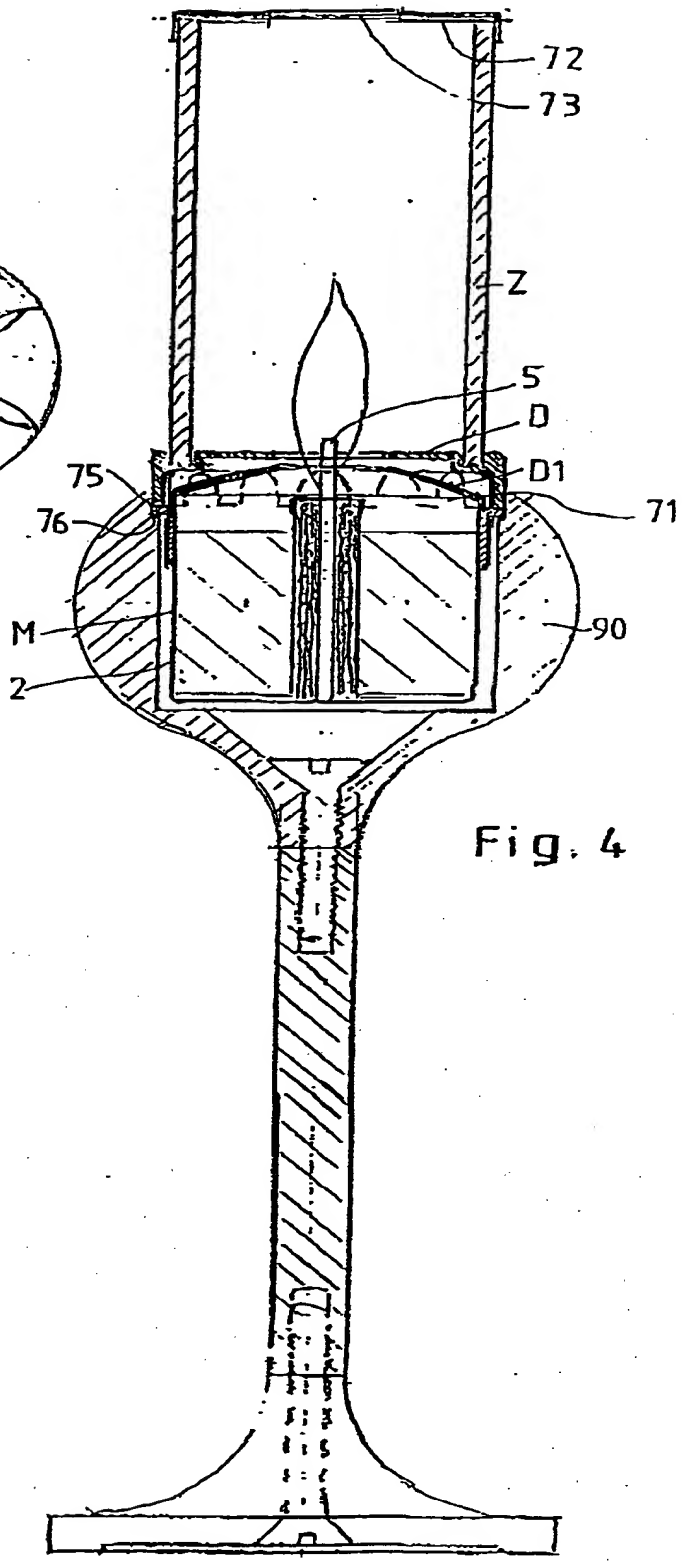


Fig. 4